

The Effects of Fiscal Policy in a Small Open Economy: The Role of Useful Government Spending

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Abstract

The aim of this paper is to analyze the positive and normative effects of fiscal policy in a small open economy, making use of a model with utility enhancing government spending. I develop an analytically tractable model that introduces the idea of modelling private and public consumption as substitutes in private utility into the small open economy model contained in the Appendix to Obstfeld and Rogoff (1995). The model offers simple and intuitive predictions on how fiscal expansion affects the economy, and how the effects depend on the marginal rate of substitution between private and public consumption. I show that the introduction of useful government spending induces both a bigger crowding-out effect on private consumption and a smaller positive impact on output compared to the pure waste case. These results are consistent with Ganelli (2003). I also show that fiscal expansion does not affect the exchange rate and, consequently, that the effectiveness of fiscal policy on output is not determined by the exchange rate regime. This casts doubt on the claim that the effectiveness of fiscal policy in a small open economy depends primarily on whether the exchange rate is fixed or flexible.

Keywords: Fiscal policy, direct crowding-out, new open economy macroeconomics

JEL classification: E62, F41, H4

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1 Introduction

The purpose of this paper is to examine how permanent balanced-budget fiscal expansion affects a small open economy in a flexible exchange rate regime, making use of a model with utility enhancing government spending. The main motivation for this research comes from two interrelated observations. Firstly, despite the fact that analyzing the international effects of fiscal policy is a classical theme for research in international macroeconomics, the literature on the new open economy macroeconomics (NOEM) pays less attention to this important issue. In particular, it almost completely ignores the analyses of the effects of fiscal policy on small economies. Secondly, most models in the NOEM literature assume that government spending brings no utility, which can be interpreted as an oversimplified assumption.

After the seminal paper "Exchange Rate Dynamics Redux" (1995) by Obstfeld and Rogoff, the profession started to use the term new open economy macroeconomics to describe research on open economy macroeconomics that integrates typical Keynesian features, imperfect competition and nominal rigidities, into a dynamic general equilibrium framework. These new open economy macroeconomic models are based on the assumption that nominal rigidities and market imperfections in a dynamic general equilibrium framework better describe the reality. Furthermore, the adoption of a dynamic utility-theoretic approach by the NOEM literature allows an explicit utility-based welfare analysis of fiscal policy, and can thus be used as the basis for the design of optimal fiscal policy.

The model I present in this paper combines the small open economy model contained in the Appendix to Obstfeld and Rogoff (1995) with the idea of modelling private and public consumption as substitutes in private utility. As emphasized by Ganelli (2003), one drawback of the recent NOEM literature is that government spending is normally assumed to be pure waste or to affect private utility in an additively separable way. The idea of specifying preferences in a non-separable way and modelling private and public consumption as substitutes in private utility is advantageous: in this framework public consumption can have a direct crowding-out effect on private consumption. The idea of

viewing public consumption as substitute for private consumption was pioneered by Bailey (1971, Chapter 9), who studied the direct crowding-out effect in the IS-LM model. The topic was also studied in the IS-LM model by Buiter (1977). An important contribution to the topic was done by Barro (1981 & 1989), who studied direct crowding-out in the neoclassical approach to fiscal policy. Studies that address direct crowding-out also include Heijdra and Ligthard (1997), who used a static closed economy model with imperfect competition. In the Real Business Cycle framework (perfect competition, flexible price-models), the topic has been studied by Roche (1996) and Finn (1998). Making use of the NOEM framework, Ganelli (2003) studied the effects of modelling private and public consumption as substitutes on consumption and output multipliers and welfare in a two-country global model.

The main purpose of the paper is to analyze the effects of permanent balanced-budget fiscal expansion in a small open economy, assuming that the government spends exclusively on domestically produced goods. I focus attention on how the effects of fiscal expansion depend on the marginal rate of substitution between private and public consumption. The second purpose of the paper is to implement a detailed utility-based welfare analysis of fiscal policy. This paper attempts to fill in the gap in literature by analyzing the effects of fiscal expansion in a small open economy in a framework where fiscal policy shocks can have a direct crowding-out effect on private consumption.

In this paper, I present a small-country two-sector model in which the nontraded goods sector is the locus of monopoly and sticky-price problems and the traded goods sector has a single homogenous output that is priced in competitive world market. In this model, fiscal expansion effectively influences macroeconomic variables: Fiscal expansion raises the output of nontraded goods and crowds out private nontraded goods consumption. The magnitudes of the effects depend on the time horizon and the marginal rate of substitution between private and public spending. The rise in output is bigger in the short run, when prices are sticky and output demand-determined, whereas the crowding-out effect is bigger in the long run. The higher the substitutability between private and public consumption, (i) the bigger is the crowding out effect on private consumption (ii) and the smaller is the

positive effect on output. These results are consistent with Ganelli (2003), who showed that the introduction of useful government spending tends to reduce consumption and output relative to the pure waste case. The detailed utility-based welfare analysis shows that fiscal expansion does not induce a rise in domestic welfare, even if government spending directly affects private utility. This result is in contrast with Ganelli (2003), who concluded that the introduction of utility enhancing government spending reverses the beggar-thyself welfare result on the specific parameter values.

In this model, in contrast to the models by Obstfeld and Rogoff (1995) and Ganelli (2003) and the Mundell-Fleming model, fiscal policy does not affect the exchange rate. Higher money demand caused by a rise in government spending is offset by a fall in private consumption (and by a rise in the price of nontraded goods in the long run). Consequently, fiscal expansion has no effect on money demand and the exchange rate. In this model, the effectiveness of fiscal policy is not determined by the exchange rate regime but by the marginal rate of substitution between private and public consumption. This casts doubt on the claim that the effectiveness of fiscal policy on output in a small open economy depends primarily on whether the exchange rate is fixed or flexible.

The rest of the paper is organized as follows. Chapter 2 introduces the model that combines the small open economy model contained in the Appendix to Obstfeld and Rogoff (1995) with the idea of modelling private and public consumption as substitutes in private utility. Chapter 3 analyzes the short-run and long-run adjustment to a fiscal shock and then analyzes the welfare effects of the fiscal shock. Chapter 4 concludes the paper.

2 Small Open Economy Model

In this Chapter, I develop a perfect-foresight general equilibrium model to analyze the effects of fiscal policy. The model is a version of the model contained in the Appendix to Obstfeld and Rogoff (1995), and presented in more detail in Chapter 10.2 of Obstfeld and Rogoff (1996). However, Obstfeld and Rogoff used their model to investigate the effects of a once-and-for-all rise in money supply. The model I present here combines the small

country Obstfeld-Rogoff model with the idea of modelling private and public consumption as substitutes in private utility. As mentioned, studying the consequences of modelling private and public consumption as substitutes in a two-country global NOEM model was done by Ganelli (2003).

Specifying preferences, technology, demand functions and budget constraints starts the presentation of the model, after which needed first-order conditions are derived. Then we solve for an initial (zero government spending) steady state. To study the dynamic effects of fiscal policy, a log-linear approximation around the initial steady state is used. Since prices are sticky in the short run (by assumption), and flexible in the long run, the solution allows for distinguishing the impact of the first-period and the steady-state effects of fiscal expansion. This creates an opportunity to examine both the short-run and the long-run effects of fiscal expansion.

2.1 Market Structure and Preferences

The assumption about imperfect competition is a pivotal factor of the model. Firstly, the effects on fiscal expansion in an imperfectly competitive economy are important and interesting in the sense that the equilibrium in imperfectly competitive economies is not Pareto-efficient. For that reason, it is possible that expansive fiscal policy brings output closer to the social optimum and increases welfare. Secondly, in the imperfectly competitive equilibrium prices are above the social optimum and policies that increase output are more likely to be a welfare increasing compared to in perfectly competitive economies. Thirdly, in imperfect competition prices are above marginal costs, and it is profitable to meet unexpected demand at the present price. This serves as a justification of the assumption of demand-determined output in the short-run.

As mentioned, I consider a small-country model in which the nontraded goods sector is monopolistically competitive, with an elastic labour supply and prices sticky in the short-run. The home country is populated by a continuum of consumer-producers (agents) that

are indexed by $z \in [0,1]$. As producers, they all produce, using their own labour as input differentiated perishable nontraded goods which are also indexed by z . As consumers, they consume all goods produced in the home country. The traded goods sector has a single homogenous output that is priced in the competitive world market. The output of tradables is exogenous as the agents are endowed with a constant quantity of tradables in each period.

Preferences are specified in such a way that the model combines the idea that government consumption affects utility in a non-separable way. A representative home agent maximizes his/her intertemporal utility function that depends positively on private consumption, (per-capita) government spending and real balances and, negatively, on output because of the disutility cost of producing it. The lifetime utility of agent z is given by

$$(1) \quad U_t = \sum_{s=t}^{\infty} \beta^{s-t} \left[\gamma \log C_{T,s} + (1-\gamma) \log(C_{N,s} + \alpha G_{N,s}) + \chi \log \left(\frac{M_s}{P_s} \right) - \frac{\kappa}{2} y_{N,s}(z)^2 \right],$$

where U_t denotes utility at time t , β ($0 < \beta < 1$) is the discount factor, $C_{T,s}$ is consumption of tradables at time s , and γ is the share of tradables in total consumption. The variable $C_{N,s}$ is the private nontraded goods consumption index (a composite of differentiated varieties of nontraded goods), defined as

$$(2) \quad C_N = \left(\int_0^1 c(z)^{\frac{\theta-1}{\theta}} dz \right)^{\frac{\theta}{\theta-1}},$$

where θ (> 1) is the elasticity of substitution between varieties of nontraded goods (and also the price elasticity of demand of a single good z) and $c(z)$ is consumption of good z . The government consumption index ($G_{N,s}$) is aggregated in the same way as private nontraded goods consumption, and with the same elasticity of demand¹

$$G_N = \left(\int_0^1 g(z)^{\frac{\theta-1}{\theta}} dz \right)^{\frac{\theta}{\theta-1}},$$

where $g(z)$ is government consumption of good z . In equation (1), α ($0 \leq \alpha \leq 1$) is the marginal rate of substitution between private and public nontraded goods consumption, and it therefore reflects the utility that consumers get from public consumption. In the utility

¹ The assumption that private and government consumption have the same elasticity of demand rules out the possibility that a rise in government spending would change the elasticity of total demand.

function (1), $\chi (> 0)$ is the parameter and M_s is nominal money balances held by the agent at time s . P_s is the consumption-based price index (defined below). The last term in (1) captures the disutility of work effort, $y_s(z)$ is the output of good z , and $\kappa (> 0)$ is the parameter. The production function can take the form $y = AL^\eta$, where L stands for labour input, A technology and $\eta < 1$.

The consumption-based price index, defined as the minimum cost of purchasing one unit of private composite consumption, is

$$(3) \quad P = \frac{P_T^\delta P_N^{1-\delta}}{\delta^\delta (1-\delta)^{1-\delta}}.$$

In this equation, δ and $1 - \delta$ denote the shares of private consumption of traded and nontraded goods in total private consumption, respectively. The variable P_T is the price of tradables. The law of one price holds in tradables, as it is assumed that there are no costs or impediments to trade between the home country and the world market. For simplicity, we can normalize the exogenously determined world price of tradables (the foreign currency price of it) to unity, which then implies $P_T = E$, where E denotes the nominal exchange rate, defined as the home currency price of foreign currency. Hence, the price of tradables is proportional to the nominal exchange rate. The variable P_N in equation (3) is the nontraded goods price index. It follows from equation (2) that the nontraded goods price index is

$$P_N = \left(\int_0^1 p_N(z)^{1-\theta} dz \right)^{\frac{1}{1-\theta}},$$

where $p(z)$ is the price of nontraded good z .

The preferences assumed here imply that nontraded goods producers face the downward-sloping (constant-elasticity-of-substitution) demand curves

$$(4) \quad y_N(z) = \left(\frac{p_n(z)}{P_N} \right)^{-\theta} (C_N^A + G_N^A),$$

which indicates that demand for a good depends on its relative price, the elasticity of demand with respect to relative price and aggregate (per-capita) nontraded goods expenditures.

2.2 Budget Constraints and Utility Maximization

To complete the specification of the individual's problem, we need to write down budget constraints faced by private the agents. In every period, the representative individual is subject to the budget constraint

$$(5) \quad \begin{aligned} P_{T,t}B_t + M_t &= P_{T,t}(1+r)B_{t-1} + M_{t-1} + p_{N,t}(z)y_{N,s}(z) \\ &+ P_{T,t}\bar{y}_{T,t} - P_{N,t}C_{N,t} - P_{T,t}C_{T,t} - P_{N,t}\tau_t \end{aligned},$$

where B denotes the stock of riskless real bonds (denominated in tradables) held by the agent entering period $t + 1$, M_t is the agent's money balances entering period $t + 1$, r denotes the constant world net interest rate earned on bonds between periods $t - 1$ and t , $\bar{y}_{T,t}$ is exogenously given quantity of tradables and τ is per capita taxes denominated in units of nontraded goods.

The government is assumed to provide nontraded goods, free of charge, to the agents. The governmentally provided goods can be utility enhancing to the agents; however, as modelling assumes that individual utility depends on per-capita public consumption these goods cannot be "public goods" in sense of being nonrival goods (Barro 1981, 1090). It is assumed that the government balances its budget in each period and finances its spending by means of non-distortionary taxes and seigniorage. The government budget constraint, expressed in per capita terms and in units of nontraded goods, can be written as

$$G_t = \tau_t + \frac{M_t - M_{t-1}}{P_{N,t}}.$$

The representative home agent maximizes the utility function (1) subject to the budget constraint specified in equation (5). In this framework, an increase in nontraded output lowers its price and this has to be taken this into account. As shown in Appendix A, the first-order conditions for the maximization problem of the representative agent can be written (the indexes denoting the agents are dropped):

$$(6) \quad \beta(1+r)C_{T,t} = C_{T,t+1},$$

$$(7) \quad C_{N,t} + \alpha G_{N,t} = \left(\frac{1-\gamma}{\gamma} \right) \frac{P_{T,t}}{P_{N,t}} C_{T,t},$$

$$(8) \quad y_{N,t}^{\frac{\theta+1}{\theta}} = \frac{(1-\gamma)(\theta-1)}{\theta\kappa} (C_{N,t}^A + G_{N,t}^A)^{\frac{1}{\theta}} (C_{N,t} + \alpha G_{N,t})^{-1} \text{ and}$$

$$(9) \quad \frac{M_t}{P_t} = \frac{\chi}{(1-\gamma)} \frac{P_{N,t}}{P_t} \left(\frac{1+i}{i} \right) (C_{N,t} + \alpha G_{N,t}),$$

where i is the nominal interest rate defined by the Fisher identity²

$$1+i = (1+r) \frac{P_{T,t+1}}{P_{T,t}}.$$

Equation (6) is the standard consumption Euler equation. It implies that the representative agent smooth consumption of tradables independently of nontraded goods production or consumption. For simplicity, I assume equality of the discount rate and the world interest rate, which then implies that the optimal time path for tradables consumption is perfectly flat. Equation (7) governs the optimal allocation of total consumption spending between tradables and nontraded goods. The ratio of the marginal utilities of tradables to nontraded goods equals the relative price of tradables to nontraded goods. Thus, the time path of nontraded goods consumption is tilted by changes in the relative price of tradables to nontraded goods. Equation (8) is the labour-leisure trade-off condition that ensures that the marginal disutility of producing an extra unit of a nontraded good is equal to the marginal utility from consuming the added revenue that the extra unit of the nontraded good brings. The equation indicates that labour supply is a positive function of aggregate government expenditure, but it is also a negative function of government consumption. The reason why labour supply is a negative function of government consumption is the following: An increase in αG reduces the marginal utility of private consumption, inducing the agents to substitute into leisure out of work. Equation (9) is the money market equilibrium condition which indicates that demand for real balances is a positive function of private and public consumption (instead of being only a function of gross income) and a negative function of the interest rate. Also according to the money market equilibrium condition (see equation (A6)) the agents must get same utility from spending money today (consuming a unit of the

² Note that, because bonds are denominated in tradables and the law of one price holds in tradables, the Fisher identity implies uncovered interest parity.

consumption good) or from holding money today and using today's money for consumption tomorrow (at $t + 1$). The optimal amount of money balances is chosen such that the marginal utility of private consumption equals the marginal utility of real balances. This fact can be used to understand why demand for real balances is a positive function of government consumption (follows Ganelli 2003): An increase in αG reduces the marginal utility of private consumption, inducing the agents to substitute private consumption with real balances. Therefore, demand for real balances is a positive function of government consumption.

2.3 Symmetric Steady State Equilibrium

In order to solve the model I am going to use a log-linear approximation around a steady state. On the choice of the steady state I follow the OR model. Firstly, it is convenient to log-linearize the model around a steady state in which initial net foreign asset and government expenditure are both zero ($B_0 = 0$ and $G_0 = 0$, where zero subscripts denote the initial steady state), and all prices are fully flexible and all exogenous variables are constant. Secondly, the endowment of tradables can be normalized so that the relative price of nontraded goods in terms of tradables is unity. Thirdly, in a symmetric equilibrium, all agents set the same price, and consume and produce the same amount of the differentiated good in the economy. In addition, it is assumed that all agents consume the same amount of governmentally provided goods. Then the equilibrium on the market for nontraded goods imply

$$y_N(z) = C_N(z) + G_N(z) = C_N^A + G_N^A.$$

From the Euler equation for tradables consumption follows that the intertemporal profile of tradables consumption is flat. And given that the output of tradables is constant and initial holding of net foreign asset is zero, these assumptions imply that

$$C_{T,t} = \bar{y}_t \quad \forall t.$$

Therefore the economy has a balanced current account regardless of shocks to nontraded goods production, and fiscal policy does not lead to international redistribution of wealth through current account changes.

In the initial zero government spending steady state $C_{N,t} = y_{N,t}$, thus the first-order condition governing each the agents' optimal choice of the output of nontraded goods, equation (8), then implies that the steady-state output of nontraded goods is given by (as in the small-country OR model)

$$(10) \quad \bar{y}_{N,0} = \left[\frac{(1-\gamma)(\theta-1)}{\theta\kappa} \right]^{\frac{1}{2}}.$$

Because each agent has monopoly power over the nontraded good she/he produces, the home output is suboptimally low in the decentralised competitive equilibrium. To see this note that a benevolent social planner would maximize total utility from the output (consumption) of nontraded goods

$$\max_{\bar{y}_N} \left[(1-\gamma)\log(\bar{y}_N) - \frac{\kappa}{2}\bar{y}_N^2 \right] \Rightarrow \bar{y}_N^{SP} = \left(\frac{1-\gamma}{\kappa} \right)^{\frac{1}{2}} > \left[\frac{(1-\gamma)(\theta-1)}{\theta\kappa} \right]^{\frac{1}{2}} = \bar{y}_{N,0}.$$

This clearly indicates that the output level in the decentralised competitive economy is always below the output level realized in an economy dictated by a benevolent social planner. Hence, it is possible that fiscal expansion can increase output closer to the social optimum and increase welfare. In addition, the preceding equations show that the degree of monopolistic distortion determines by how much the output level the initial steady state is below the socially optimal output level. As the elasticity of demand increases, the differentiated nontraded goods become closer substitutes, and consequently the monopoly power decreases.

3 Effects of Fiscal Expansion

Now I turn to analysis of the effects of unanticipated permanent balanced-budget fiscal expansion. It is assumed that prices of nontraded goods sticky, as they are set one period in advance and fully flexible after the period. It follows from this assumption that it takes one

period to reach the new steady state after a fiscal shock hits the economy. The next step is to solve for the steady state effects of a fiscal shock when prices are flexible and all variables except government spending are constant.

3.1 Steady-State Effects of Fiscal Expansion

As mentioned above, as the next step, I use a log-linear approximation of the model around the initial (zero government spending) steady state. Each variable are expressed in deviations from the initial steady state, and the short run and the long run deviations are denoted as follows

$$\hat{x} = \frac{x_t - x_0}{x_0} \text{ and}$$

$$\hat{\bar{x}} = \frac{x_{t+1} - x_0}{x_0}.$$

The variables whose initial steady-state value is zero are normalized by consumption, for example

$$\hat{G} = \frac{G_t - G_0}{C_0}.$$

Taking logarithmic transformation and then the first-order Taylor expansion $f'(x_0)(x - x_0)$ from the goods market equilibrium equation and from the labour-leisure trade-off condition (8) using above mentioned definitions one can get

$$\hat{y}_N = \hat{C}_N + \hat{G}_N \text{ and}$$

$$(\theta + 1)\hat{y}_N = -\theta\left(\hat{C}_N + \alpha\hat{G}_N\right) + \hat{C}_N + \hat{G}_N.$$

These equations can be solved to yield

$$(11) \quad \hat{C}_N = -\left(\frac{1+\alpha}{2}\right)\hat{G}_N \text{ and}$$

$$(12) \quad \hat{y}_N = \left(\frac{1-\alpha}{2}\right)\hat{G}_N.$$

The interpretation of equations (11) and (12) is the following: First, permanent balanced-budget fiscal expansion raises the steady-state output of nontraded goods (unless $\alpha = 1$) and crowds out private consumption. The steady-state output increases as the agents respond to fiscal expansion by substituting into work out of leisure. Consequently, private consumption falls by less than the rise in government spending. Second, when the governmentally provided goods are utility enhancing to the agents (that is $\alpha > 0$, instead of $\alpha = 0$), the consumption and output multipliers are reduced by an amount that is increasing in α . It implies that the higher the substitutability is between private and public consumption (higher value of α), (i) the bigger is the crowding-out effect on private consumption (ii) and the smaller is the positive impact on output (as in Ganelli 2003). The effects clearly indicate the logic of direct crowding-out: when government provides goods that are substitutes for private consumption, the fall in consumption is bigger than in the pure waste case. If the marginal rate of substitution between private and public consumption is less than one, the economy reaches an equilibrium which corresponds to lower private consumption and higher output levels relative to the initial steady-state allocation. However, if public consumption is perfect substitute with private consumption ($\alpha = 1$) a rise in government spending does not affect the output of nontraded goods but it indeed crowds out private consumption on a one-to-one basis.

As I showed in Chapter 3.3, the initial steady-state output of nontraded goods is inefficiently low because of the monopolistic distortion. A rise in government spending which induces an increase in labour supply (requires $\alpha < 1$) consequently brings the output level of nontraded goods closer to the social optimum. A rise in government spending can thus abate the distortion caused by monopolistic competition. However, the flip side of the coin is that a rise in government spending crowds out private consumption, and as private consumption falls by less than αG_N increases, “effective consumption” of nontraded goods (that is $C_N + \alpha G_N$) falls. “Effective consumption”, which was already suboptimally low, is thus driven even lower and farther away from its social optimal level.

To solve for \hat{P}_N , one can substitute equation (11) into the log-linearized money market equilibrium condition (9) to yield

$$(13) \quad \hat{P}_N = \left(\frac{1-\alpha}{2} \right) \hat{G}_N.$$

According to equation (13), fiscal expansion raises the nontraded goods price index, if governmentally provided goods are not perfect substitutes with private consumption. Higher government spending leads to an outward shift in the demand curve facing the agents, therefore allowing them to raise their prices. The preceding equation implies a role for the marginal rate of substitution between private and public consumption: the smaller the substitutability is the greater is the positive impact on the nontraded goods price index. In addition, the rise in the nontraded goods price index is proportional to that in the output of nontraded goods.

If α is less than one, a rise in the nontraded goods price index is necessary in order to maintain the money market equilibrium. In this case, a rise in government spending crowds out private consumption by more than αG raises, thus “effective consumption” of nontraded goods decreases, which lowers money demand. The reduction in “effective consumption” of nontraded goods then implies that in order to maintain equilibrium in the money market, money demand must increase, requiring a rise in the nontraded goods price index. This rise increases money demand, causing equilibrium in the money market.

The log-linearized version of equation (7), which governs the optimal allocation of total consumption spending between tradables and nontraded goods, is

$$\hat{C}_N + \alpha \hat{G}_N = \hat{P}_T - \hat{P}_N.$$

Substituting equations (11) and (13) into the preceding equation yield to $\hat{P}_T = 0$. The startling implication of this equation is that fiscal expansion does not affect the nominal exchange rate (the price of tradables is proportional to the exchange rate). From the allocation of total consumption spending between tradables and nontraded goods, it is known that in an optimal case, the ratio of the marginal utilities of tradables to nontraded goods equals the relative price of tradables to nontraded goods. Consumption of tradables does not change, which implies that the marginal utility of consumption of tradables is constant over time. If α is less than one, the reduction in “effective consumption” increases

the marginal utility of consumption of nontraded goods. Hence, in order to maintain the optimal allocation of total consumption spending, an adjustment in the relative price ratio is needed. As mentioned, because of the increase in demand for nontraded goods it is optimal for the agents to increase their prices. Since the price of tradables remains constant, the relative price of nontraded goods increases. As a result, the rise in the nontraded goods price index and the reduction in “effective consumption” of nontraded goods guarantee that the ratio of the marginal utilities equals the relative price ratio without an adjustment in the price of tradables. However, if α is one, “effective consumption” does not change, which implies that the marginal utility of “effective consumption” does not change. Therefore, an adjustment in the relative price is not needed.

One can use the log-linear version of the price index equation (3), with \hat{P}_T unchanged and \hat{P}_N given by equation (13), to yield the steady-state change in the consumption-based price index

$$\hat{P} = (1 - \delta) \left(\frac{1 - \alpha}{2} \right) \hat{G}_N.$$

The preceding equation clearly indicates that the rise in the consumption-based price index is determined by the rise in the nontraded goods price index and the share of private consumption of nontraded goods in total private consumption.

3.2 Short Run Equilibrium Response to Fiscal Expansion

The next step is to solve for the short-run effects of fiscal expansion when prices in the nontraded goods sector are sticky. The assumption of sticky prices introduces a typical Keynesian feature in the model: output is entirely demand determined (for small enough expansion) in the period following a fiscal shock. Since output is demand-determined the labour-leisure trade-off equation (8) does not hold. To solve for the short-run effects of a fiscal shock on private consumption and output one can log-linearize equation (7) and the money market equilibrium condition (9), keeping in mind that $\hat{P}_T = 0$, to yield

$$\hat{C}_N + \alpha \hat{G}_N = \hat{P}_T \text{ and}$$

$$\hat{C}_N + \alpha \hat{G}_N = -\frac{\beta}{1-\beta} \hat{P}_T.$$

Together these equations imply that \hat{P}_T must be zero. A rise in government spending raises money demand, thus in order to maintain equilibrium in the money market, money demand must fall. Demand for money falls, when the prices of nontraded goods are sticky, if the nominal interest rate rises and/or consumption decreases. Since the nominal interest rate is defined by the Fisher identity and the nominal rate is unchanged in the steady state, the rise in nominal interest rate means an appreciation of the currency. Thereby, in order to balance money demand with supply, consumption must fall and/or the currency must appreciate. The latter is, however, inconsistent with the optimal allocation of total consumption spending. In the short run, when both tradables consumption and the prices of nontraded goods are constant, private consumption has to decrease and/or the price of tradables raise. Otherwise the ratio of the marginal utilities of tradables to nontraded goods does not equal their relative price ratio. The only means to both allocate total consumption spending optimally and to maintain the money market equilibrium simultaneous is a fall in private consumption with an unchanged exchange rate. The following equation, therefore, has to hold

$$\hat{C}_N + \alpha \hat{G}_N = 0 \Rightarrow \hat{C}_N = -\alpha \hat{G}_N. \quad (14)$$

Combining this with the log-linear demand equation one can get

$$(15) \quad \hat{y}_N = (1-\alpha) \hat{G}_N.$$

Equations (14) and (15) imply that the short-run effects on consumption and output of fiscal expansion go in the same direction as the steady state effects (if the marginal rate of substitution between private and public consumption is positive but less than one): Fiscal expansion increases short-run output and crowds out private consumption. Comparing equation (12), which gives the steady-state rise in output, with equation (15), one can see that the rise in output is higher in the short run. On the other hand from equations (11) and (14), one can see that the crowding-out effect is smaller in the short run. Equations (14) and (15) strengthen the argument that when government spending is useful, the output and consumption multipliers are reduced by an amount that is increasing in α : The higher the

substitutability between private and public consumption, (i) the smaller is the positive effect on output (ii) and the bigger is the crowding-out effect on private consumption. A rise in government spending leaves the exchange rate unaffected, due to the reasons discussed above, and thereby it does not cause crowding-out or crowding-in through exchange rate changes. The expansionary effect of fiscal policy is offset only to the extent that governmentally provided goods are substitutes for private consumption. There are no other effects on private consumption – only the direct crowding-out effect.

The model presented here yields important insights into the effectiveness of fiscal policy in small open economies. In the case when government spending is pure waste, it can be seen from equation (15), that the “balanced budget multiplier” is exactly one. This result is in sharp contrast with the result derived from the Mundell-Fleming model. In the Mundell-Fleming model, the effectiveness of fiscal policy on output in a small open economy depends primarily on whether the exchange rate is flexible or fixed. In a flexible exchange rate regime, a rise in government spending tends to increase money demand raising the interest rate, thus capital inflows attracted by the higher interest rate appreciate the exchange rate. This appreciation induces an expenditure-switching effect which causes complete crowding-out, and consequently fiscal policy becomes ineffective and the “balanced budget multiplier” is zero. In this model, the effectiveness of fiscal policy is independent of the exchange rate regime. This effectiveness is determined by the marginal rate of substitution between private and public consumption, and only in the case when private and public consumption are perfect substitutes is fiscal policy unable to influence output. In this case fiscal policy only affects the composition of aggregate demand, but not the level of output.

In summary, a permanent rise in government spending generates a short-run increase in the output of nontraded goods (unless $\alpha = 1$), but it leaves the current account and the nominal exchange rate unaffected. Since the price of the traded good is unchanged and the prices of nontraded goods are sticky, the consumption-based price index remains in the pre-shock level. After one period, the prices of nontraded goods are adjusted and a rise in government spending raises the consumption-based price index (unless $\alpha = 1$). In the steady state, when

the economy returns to the labour supply curve, output decreases relative to the short run output, and consequently the crowding-out effect is bigger in the steady state (again, unless $\alpha = 1$). In the case when private and public consumption are perfect substitutes a rise in government spending only affects the composition of aggregate demand (private consumption is reduced on a one-to-one basis), but leaves all other macroeconomic variables unaffected.

3.3 Welfare Effects of Fiscal Expansion

As mentioned, one advantage of the NOEM framework is that it allows an explicit utility-based welfare analysis of fiscal policy, and the analysis can thus be used as the basis for the design of optimal fiscal policy. Analyzing the welfare effects of fiscal policy is important, because unless economic models do not embody meaningful welfare criteria, they can yield misleading policy prescriptions even for the problems they were designed to address (Obstfeld – Rogoff 1995, 625).

According to the utility function (1), fiscal policy can affect welfare by changing private consumption, public consumption, real balances and output. As usual in the NOEM literature, I focus on the real component of the utility function, neglecting the welfare effect of real balances. The welfare effect of fiscal policy is the sum of short-run change in utility and the discounted present value of the steady-state change in utility. Since the economy reaches the steady state after one period, the differentiated utility function is

$$(16) \quad U_t^R = \gamma \hat{C}_T + (1-\gamma) \left(\hat{C}_N + \alpha \hat{G}_N \right) - \kappa \bar{y}_{N,0}^2 \hat{y} + \frac{\beta}{1-\beta} \left[\gamma \hat{C}_T + (1-\gamma) \left(\hat{C}_N + \alpha \hat{G}_N \right) - \kappa \bar{y}_{N,0}^2 \hat{y} \right].$$

It could be shown, by substituting into (16) steady state output equation (9) and the multipliers (11), (12), (14) and (15) derived, that a rise in government spending does not affect welfare if $\alpha = 1$ and causes a fall in welfare if $\alpha < 1$. In the case when governmentally provided goods are partial substitutes with private consumption the negative welfare effect results from three factors. Firstly, the increase in output, both in the short run and in the steady state, leads to a decrease in welfare. Secondly, in the short run the rise in

government consumption crowds out private consumption, which decreases welfare. However, the fall in welfare caused by the crowding-out effect is perfectly offset by the positive welfare effect that the rise in government spending affects. Thirdly, expansive fiscal policy leads to a higher crowding-out effect in the steady state than in the short run, and in the long-run the negative welfare effect that crowding-out causes is larger than the positive welfare effect that higher government spending brings. All in all, the main reason for the beggar-thyself result of fiscal expansion is that private consumption is reduced while public consumption is increased: the total utility is lowered since one unit of public consumption gives less utility than one unit of private consumption. Furthermore, the agents have to work more to produce less utility enhancing government consumption.

Maintaining the assumption of $\alpha < 1$, the welfare effects also indicate a role for the marginal rate of substitution between private and public consumption. This is a consequence of three factors. The higher the substitutability (i) the bigger is the direct increase in utility, (ii) the smaller is the rise in output (iii) and the bigger is the direct crowding-out effect on private consumption. The first two effects indicate that the smaller the substitutability is the more a rise in government spending decreases welfare. However, the third effect means the opposite. It could be shown that the first two effects more than offset the third one. Consequently, the less fiscal policy decreases welfare the higher is the marginal rate of substitution between private and public consumption. This result is consistent with Ganelli (2003), who claimed that the introduction of a positive α unambiguously raises welfare compared to the pure waste case.

However, in the case when private and public consumption are perfect substitutes a rise in government spending does not lower welfare. In this case a rise in government spending does not raise the output of nontraded goods and the direct increase in utility from government spending perfectly offsets the negative welfare effect caused by direct crowding-out. The result that fiscal expansion is never welfare-improving is in contrast with Ganelli (2003), who concluded that the introduction of utility enhancing government spending reverses the beggar-thyself welfare result on the specific parameter values. A rise in welfare happens if the direct increase in utility from government spending more than

offsets the negative effects caused by decreased private consumption and increased output. In this model, the positive welfare effect that higher government spending brings is never enough to more offset the negative welfare effect. Therefore, if a government in a small open economy desires to maximize the welfare of the representative agent, it should not implement fiscal expansion.

4 Conclusions

This paper presents an analytically tractable model to study the positive and normative effects of permanent balanced-budget fiscal expansion in a small open economy in a flexible exchange rate regime. The model uses the strengths of the new open economy macroeconomics framework by explicitly deriving the short- and long-run effects of fiscal expansion from a fully dynamic model with utility-maximizing agents. The main contribution of this paper to the field is that it analyzes the effects of fiscal policy in a small open economy, making use of the model with useful government spending. Specifying preferences in a non-separable way is advantageous: in this framework fiscal policy has a direct crowding-out effect on private consumption.

A rise in government spending raises the output of nontraded goods (unless governmentally provided goods are not perfect substitutes with private consumption) and crowds out private nontraded goods consumption. The magnitudes of the effects depend on the time horizon and the marginal rate of substitution between private and public consumption. The rise in output is bigger in the short run, when prices are sticky and output demand-determined, whereas the crowding-out effect is bigger in the long run. The higher the substitutability is between private and public consumption, the bigger is the crowding-out effect on private consumption and the smaller is the positive impact on output. These results are consistent with those found by Ganelli (2003), who showed that the introduction of useful government spending reduce consumption and output compared to the pure waste case.

In this model, in contrast to e.g. the Mundell-Fleming model, fiscal policy does not affect the nominal exchange rate, and consequently the effectiveness of fiscal policy on output is independent of the exchange rate regime. This casts doubt on the claim that the effectiveness of fiscal policy in a small open economy depends primarily on whether the exchange rate is fixed or flexible. This effectiveness, in this model, is determined by the marginal rate of substitution between private and public consumption. However, the result that fiscal policy leaves the nominal exchange rate depends on the specification of preferences. In particular, the result depends on the elasticity of substitution between traded and nontraded goods and the specification of the money demand function.

According to this model fiscal expansion causes a fall in domestic welfare, if public consumption is not a perfect substitute with private consumption. The fall in economic welfare is a consequence of two factors. Firstly, the increase in output leads to a decrease in welfare because of its disutility cost. Secondly, the negative welfare effect that is caused by decreased private consumption (due to crowding-out) is larger than the positive welfare effect that higher government spending brings. A central message of the welfare analysis is that, despite welfare-enhancing government spending, fiscal expansion is not welfare-improving in a small open economy. If the government desires to maximize the welfare of the representative agent, it should not implement fiscal expansion. However, the final conclusion of this paper is that there must be some economic reason for public spending. In particular, this model cannot explain why governments spend money on goods that can be considered to be substitutes for private consumption.

This analysis focuses on a simple case and it assumes a separable utility function in consumption of tradables and nontraded goods, complete home bias in government spending and balanced-budget fiscal expansion. One can imagine numerous variants and extensions to this model. Firstly, since the output of tradables is constant, current account behaviour is determined by the time path of tradables consumption. The optimal time path of tradables consumption is perfectly flat due to the separable utility function in consumption of tradables and nontraded goods, and consequently the economy has a balanced current account regardless of shocks to the output of nontraded goods. This can be

limiting as the role of current account imbalances in adjustment dynamics is ruled out. For example, tradable and non-tradable consumption could enter via a Cobb-Douglas aggregator into agents' utility function. Secondly, intermediate degrees of home bias in government spending could be assumed. Thirdly, it might be good to know the implications of a debt-financed rise in government spending. However, to enable an analysis of the real effects of government debt one should introduce overlapping generations to the model (as in Ganelli 2004). This is due to the fact that Ricardian equivalence holds in this framework, and it can be assumed, without a loss of generality, that the government runs a balanced budget each period (as noted by Obstfeld and Rogoff 1995, 629).

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Appendix A. Solving for the First-Order Conditions

Equation (3) can be manipulated to yield

$$(p_N(z))^{-\theta} = P_N^{-\theta} \frac{y_N(z)}{C_N^A + G_N} \quad |(\cdot)^{-1/\theta} \Rightarrow p_N(z) = y_N(z)^{-1/\theta} (C_N^A + G_N)^{1/\theta} P_N.$$

This equation is substituted into the budget constraint (5), and then one can write the appropriate Lagrangean as (the indexed denoting the agents are dropped)

$$L = \sum_{s=t}^{\infty} \beta^{s-t} \left[\gamma \log C_{T,s} + (1-\gamma) \log(C_{N,s} + \alpha G_{N,s}) + \chi \log\left(\frac{M_s}{P_s}\right) - \frac{\kappa}{2} y_{N,s}^2 \right] -$$

$$\sum_{s=t}^{\infty} \lambda_s \left(\begin{array}{l} P_{T,s} B_s + M_s - P_{T,s} (1+r) B_{s-1} + M_{s-1} + P_{N,s} y_{N,s} \frac{\theta-1}{\theta} (C_{N,s}^A + G_{N,s}^A)^{1/\theta} \\ - P_{T,s} \bar{y}_{T,s} + P_{N,s} C_{N,s} + P_{T,t} C_{T,s} \end{array} \right).$$

$$\frac{\partial L}{\partial C_{T,t}} = 0 \Rightarrow \gamma \frac{1}{C_{T,t}} - \lambda_t P_{T,t} = 0 \Rightarrow \lambda_t = \frac{\gamma}{C_{T,t} P_{T,t}} \quad (\text{A1})$$

$$\frac{\partial L}{\partial C_{N,t}} = 0 \Rightarrow (1-\gamma) \frac{1}{C_{N,t} + \alpha G_{N,t}} - \lambda_t P_{N,t} = 0 \Rightarrow \lambda_t = \frac{1-\gamma}{(C_{N,t} + \alpha G_{N,t}) P_{N,t}} \quad (\text{A2})$$

$$\frac{\partial L}{\partial y_{N,t}} = 0 \Rightarrow -\kappa y_{N,t} + \lambda_t \left(\frac{\theta-1}{\theta} \right) y_{N,t}^{-1/\theta} (C_{N,t}^A + G_{N,t}^A)^{1/\theta} P_{N,t} = 0 \quad (\text{A3})$$

$$\frac{\partial L}{\partial B_t} = 0 \Rightarrow -\lambda_t P_{T,t} + \beta \lambda_{t+1} P_{T,t+1} (1+r) = 0 \quad (\text{A4})$$

$$\frac{\partial L}{\partial M} = 0 \Rightarrow \chi \frac{1}{P_t} \frac{P_t}{M_t} - \lambda_t + \beta \lambda_{t+1} = 0 \quad (\text{A5})$$

Substituting (A1) into (A4) yields

$$(6) \quad \beta(1+r)C_{T,t} = C_{T,t+1}.$$

Combining (A2) and (A1) yields

$$\frac{1-\gamma}{(C_{N,t} + \alpha G_{N,t}) P_{N,t}} = \frac{\gamma}{C_{T,t} P_{T,t}} \Rightarrow \left(\frac{1-\gamma}{\gamma} \right) \frac{P_{T,t}}{P_{N,t}} C_{T,t} = C_{N,t} + \alpha G_{N,t}. \quad (7)$$

And because

$$\frac{\partial U / \partial C_T}{\partial U / \partial (C_N + \alpha G_N)} = \frac{P_T}{P_N}, \text{ the ratio of the marginal utilities of tradables and}$$

nontraded goods equals the relative price ratio.

Substituting (A2) into (A3) yields

$$\kappa y_{N,t} = \frac{1-\gamma}{(C_{N,t} + \alpha G_{N,t})} \left(\frac{\theta-1}{\theta} \right) y_{N,t}^{-\frac{1}{\theta}} (C_{N,t}^A + G_{N,t}^A) P_{N,t} \quad \left| * \frac{1}{\kappa y_{N,t}^{-\frac{1}{\theta}}} \right.$$

$$(8) \quad y_{N,t}^{\frac{\theta+1}{\theta}} = \frac{(1-\gamma)(\theta-1)}{\theta \kappa} (C_{N,t}^A + G_{N,t}^A)^{\frac{1}{\theta}} (C_{N,t} + \alpha G_{N,t})^{-1}.$$

Equation (A5) can be written by using (A1) and multiplying by $P_{T,t}$ to yield

$$\frac{\gamma}{C_{T,t}} = \chi \left(\frac{M_t}{P_t} \right)^{-1} \left(\frac{P_{T,t}}{P_t} \right) + \beta \left(\frac{P_{T,t}}{P_{T,t+1}} \right) \frac{\gamma}{C_{T,t+1}}.$$

We can interpretation this to be: $\frac{\partial U}{\partial M} - \frac{\partial U}{\partial C_{T,t}} \frac{1}{C_{T,t}} + \beta \frac{\partial U}{\partial C_{T,t+1}} \frac{1}{P_{T,t+1}} = 0 \quad \left| * P_{T,t} \Rightarrow \right.$

$$(A6) \quad \frac{\partial U}{\partial C_T} = \frac{\partial U}{\partial (M/P)} \frac{P_{T,t}}{P} + \beta \frac{\partial U}{\partial C_{T,t+1}} \frac{P_{T,t}}{P_{T,t+1}},$$

where first term on the right-hand side is

utility from holding money, second term is utility from using today's money for tomorrow's consumption and the term on the left-hand side is utility from spending money. From

equation (A4) one can get $\frac{\lambda_t P_{T,t}}{P_{T,t+1}(1+r)} = \beta \lambda_{t+1}$, plugging this into (A5) yields

$$\chi \frac{1}{M_t} = \lambda_t \left(1 - \frac{P_{T,t}}{P_{T,t+1}(1+r)} \right) = 0. \text{ And by using the Fisher parity } 1+i = (1+r) \frac{P_{T,t+1}}{P_{T,t}},$$

and equation (A2) one can get

$$\chi \frac{1}{M_t} = \frac{1-\gamma}{P_{N,t}(C_{N,t} + \alpha G_{N,t})} \left(\frac{i}{1+i} \right). \text{ Multiplying this by } P_t/\chi \text{ yields}$$

$$\frac{P_t}{M_t} = \frac{(1-\gamma)}{\chi} \frac{P_t}{P_{N,t}} \left(\frac{i}{1+i} \right) (C_{N,t} + \alpha G_{N,t})^{-1} \quad \left| ()^{-1} \Rightarrow \right.$$

$$(9) \quad \frac{M_t}{P_t} = \frac{\chi}{(1-\gamma)} \frac{P_{N,t}}{P_t} \left(\frac{1+i}{i} \right) (C_{N,t} + \alpha G_{N,t}).$$